

Species Composition and Movements of Nearshore Fishes from a Tag-Recapture Study near Bolinas, California

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Poster prepared by Kristen Green

SUMMARY:

- In 2005 and 2006, we conducted a tag-recapture study in the area off Bolinas, California.
- Scientists and recreational anglers collaborated in order to estimate the movements and home ranges of commercially targeted species.
- Over 7000 fish comprising 25 species were caught. Black rockfish and lingcod were the most abundant species caught.
- 3.7% of fishes tagged in 2005 have been recaptured to date, and 95% of these recaptured fish moved less than 3 nautical miles from release location.
- Mean lengths of all species, except cabezon and gopher rockfish, were either below, or no more than 3 cm above, the length at 50% maturity for the species.

Introduction:

At the request of Kate Wing (NRDC) and Roger Thomas (GGFA), we conducted a tagging project to gather information about species targeted in fisheries off Bolinas, California. We collaborated with charter boat skippers and over 250 anglers from Coastside and other local fishing clubs to catch, tag, and release fishes. We shared information with these volunteers about our research, and taught them about the characteristics of the nearshore fish populations in the area.

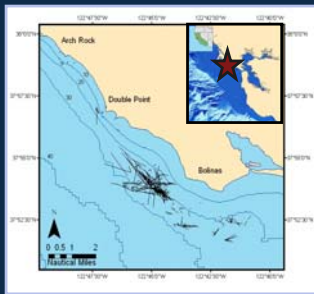


Fig. 1: Map of study area near San Francisco Bay with fishing locations (drift lines).



Chris Dewees with deckhand Tom Bernot holding a lingcod.

Methods:

All fishes were caught using rod and reel gear and identified to species (Table 1). Total length was recorded to the nearest centimeter. Fish condition at release was recorded, and individuals exhibiting swim bladder barotrauma were vented prior to release. All target species were tagged using external anchor tags. Tag number, coordinates of release, and catch depth were recorded. We posted announcements, asking for tag recapture information, on fishing club websites, local charter fishing boats, and at local tackle shops. We collected recapture data (tag number, area of recapture, date, and depth) from anglers who caught tagged fish (Table 2).

Species caught	N	% of Total
Black Rockfish	3657	65.6
Lingcod	419	7.5
Brown Rockfish	386	6.9
Blue Rockfish	255	4.6
Canary Rockfish	208	3.7
Olive/Yellowtail Rockfish	159	2.9
Gopher Rockfish	136	2.4
White Croaker	107	1.9
Vermillion Rockfish	105	1.9
Kelp Greenling (male)	43	0.8
Cabezon	29	0.5
China Rockfish	24	0.4
Kelp Greenling (female)	24	0.4
Copper Rockfish	9	0.2
Chinook Salmon	4	0.1
Staghorn Sculpin	2	<0.1
Grass Rockfish	1	<0.1
Giant Sculpin	1	<0.1
Jack Mackerel	1	<0.1
Perch	1	<0.1
Sanddab	1	<0.1
Wolf Eel	1	<0.1
Total Caught	5573	100.0

Table 1: Species composition in 2005.

Species recaptured	N	% of Total Tagged
Black Rockfish	157	4.5
Cabezon	1	3.4
Vermillion Rockfish	4	4.1
Lingcod	12	2.9
Blue Rockfish	3	2.1
Brown Rockfish	7	2.0
Yellowtail Rockfish	1	0.7
Canary Rockfish	2	1.1
Total	187	3.7

Table 2: Number and percentage of tagged fishes Recaptured in 2005 and 2006.



Kristen Green showing a canary rockfish to volunteers Morgan Williams and Peter St. John.

Preliminary Results:

Over 6500 individuals of 13 species were tagged and successfully released in 2005 and 2006. Thus far, 187 recaptures (3.7% of the total tagged fish) have been recorded in the post-study period (Table 1). Most of the tagged fish were recaptured a short distances away from location of release (Figure 2). The length-frequency data we collected indicated that much of the catch in the study region was comprised of individuals that are probably immature. Mean lengths of all species, except cabezon and gopher rockfish, were either below, or no more than 3 cm above, the length at 50% maturity for the species (Figure 3). Black rockfish were sampled in 2006 in order to classify maturity stages by size class.



Fig. 2: Map of tag-recapture locations in 2005 and 2006.

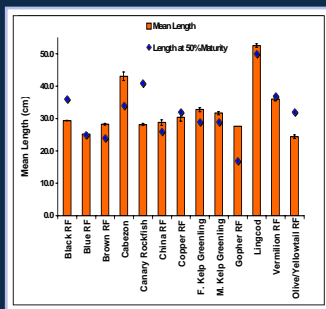


Fig. 4: Mean length of species caught vs. length at 50% majority for those species in 2005.



Ovaries of an immature female black rockfish.

Future Research:

- We will continue to record recaptured fish caught by anglers and estimate movement and home ranges of tagged species. We also plan to use the Jolly-Seber method to make population estimates.
- The maturity data we have collected indicate an abundance of small, immature fish in the Duxbury Reef area.
- Why do we see so many small fish in this area?
- To answer this, we will pursue the following hypotheses:

1. Strong recruitment pulses from prior years
2. Ontogenetic movement: Larger fish are deeper
3. Possible seasonal migration of big fish
4. Small fish are maturing earlier
5. Fisheries remove large fish
6. Fishing gear is selective to small fish

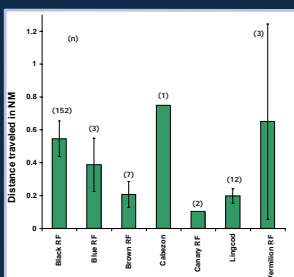


Fig. 3: Mean distance moved by fishes that moved < 10 nm.

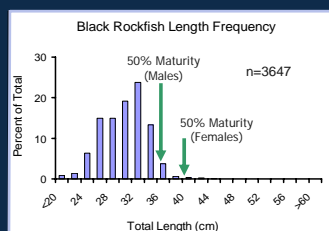


Fig. 5: Length frequency histogram for black rockfish in 2005, with arrows indicating length at 50% maturity for both male and female fish.

Female Black Rockfish Maturity 2006		
Maturity Stage	N	% of total
Immature	39	90.7
Maturing	0	0
Eyed Larvae	0	0
Post Parturition	0	0
Spent	1	2.3
Resting	3	7.0

Fig. 6: Maturity stages of female black rockfish sampled at Duxbury Reef in April 2006.